National Aeronautics and Space Administration

MARSHALL STAR

Serving the Marshall Space Flight Center Community

Jan. 6, 2011

Director's Corner

2010: The work of generations continues

In 2010, Marshall Space Flight Center marked its 50th year as a leader in our nation's exploration of space by carrying on "the work of generations" that served as our anniversary motto. We are poised to continue our exploration in 2011.

The Marshall Team helped launch three successful Space Shuttle missions in February, April, and May, and we are working toward the next launch in February 2011. Our Payload Operations Center continued supporting experiments aboard the International Space Station, while our engineering team continued to perfect the station's new Water Recovery System. The station marked its tenth year of continuous human occupation, an amazing technical and organizational achievement.

Our engineers continued working on technologies that will help develop the architecture to succeed the shuttle. We fired the final Shuttle solid rocket motor test and tested the second five-segment solid rocket motor. We had a spectacular Pad Abort 1 test of the Orion spacecraft escape system. We continued working through the usual development issues with our industry partner to get the first J-2X development upper stage engine into the test stand next year.

We expanded our SERVIR network into the Himalayan region to help another region better plan and use their natural resources and cope with manmade and weather issues – clearly making a difference in the everyday lives of people.

Continuing to support astronomy, we tested the James Webb Telescope mirrors, while the orbiting Chandra X-ray telescope discovered the youngest black hole ever. This one's even younger than most of our workforce, which helps us realize what a dynamic place our universe still is.

We launched FASTSAT from Kodiak, Alaska with six experiments devoted to space transportation, security, and environmental studies. But it also demonstrates our capability to create opportunities for secondary, scientific and technology payloads at lower costs.

We also did a lot this year to tell the Marshall and NASA story to educators, students, elected leaders, the aerospace community, and our local community. A well-educated workforce is important to the nation, and we reached youth and educators online, with materials, and speakers in our schools. Of course, two of our activities that get worldwide attention are the Great Moonbuggy Race and the Student Launch Initiative. More than 600 students from 18 states and five countries competed in the Moonbuggy event. More than 300 students from 19 states formed teams, designed rockets and payloads, and competed in the Student Launch Initiative. More than 30,000 Internet viewers tuned in around the world to watch the launch competition.

We presented papers and exhibited at conferences. We kept the media and the public informed. We Twittered and blogged, and sent dozens of speakers into the Huntsville community and region. We teamed with the Army to give visitors to Bridge Street Town Centre a look "Behind the Gates of Redstone Arsenal." And we took time to slow down and bond as a team and mark our good work with various employee events like the family picnic and our anniversary events.

In short, in 2010, we demonstrated our incredible capability and versatility.

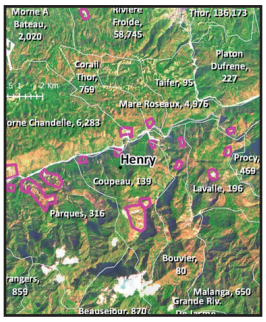
The past year also was a year of changes and challenges, most notably in NASA's human space flight effort. A year ago, a new administration was developing its position on the nation's future space policy. In 2010, the administration announced a new direction. Already on course to retire the Space Shuttle fleet, we were also directed to close out the Constellation Program.

*See **Lightfoot** on page 10*

Selected highlights of Marshall's 2010 year of accomplishments

January 2010 Year in Review

NASA captures images of Haiti after 7.0 earthquake



NASA's Earth Observing-1 satellite with the Advanced Land Imager captured images of Haiti on Jan. 15, three days after the devastating 7.0 earthquake rocked Port-au-Prince and the surrounding area. The satellite image analysis was produced by CATHALAC, the Spanish acronym for the Water Center for Humid Tropics of Latin America and the Caribbean. From its regional headquarters in Panama City, Panama, CATHALAC is one of the main implementing agencies for SERVIR, the Regional Visualization & Monitoring System for Mesoamerica and the Dominican Republic. SERVIR, which means "to serve" in Spanish, was developed by researchers at the Marshall Center. Since its establishment in Mesoamerica in 2005, the system has served as a virtual observatory of the region's atmosphere and terrestrial and marine environment.

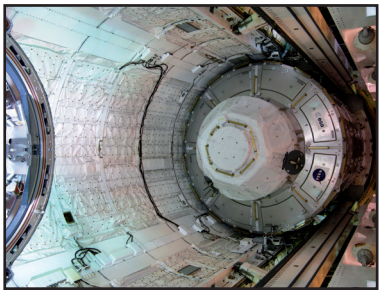
Marshall oversees first of three historic Mentor-Protégé agreements

In 2010, the NASA Mentor-Protégé Program at the Marshall Center oversaw three historic signing agreements – pairing established large companies with disadvantaged small businesses and institutions. In January, Marshall's Small Business Office finalized the first-ever Mentor-Protégé agreement between a NASA prime contractor, ATK Space Systems of Magna, Utah, and a disabled veteran-owned small business, Lansmont Corp. of Monterey, Calif. In February, Marshall hosted an agreement between Jacobs Technology of Huntsville and Tuskegee University of Tuskegee, Ala. – only the second such pact between a NASA prime and a historically black college or university. In July, NASA prime contractor Pratt & Whitney Rocketdyne of Canoga Park, Calif., partnered with Avans Machine & Tool of Scottsboro, Ala., a Historically Under-utilized Business Zone-certified small business. NASA's Mentor-Protégé Program was established in 2008 to create long-term relationships, enhance technical capabilities and enable small businesses to successfully compete for contract awards.

February 2010 Year in Review

Shuttle Endeavour delivers Node 3 and 'room with a view'

When space shuttle Endeavour launched on the first mission of 2010 from Kennedy Space Center, Fla., Feb. 8, teams at the Marshall Center felt a great deal of pride and satisfaction. Endeavour's crew delivered Node 3, also known as Tranquility, to the International Space Station during the STS-130 mission. Marshall's Node Integration Office provided technical assistance and coordination on Tranquility, the last of three space station nodes to be launched. The nodes are interconnecting elements between the various pressurized modules on the orbiting laboratory which allow passage of crew members and equipment to other station elements. Also aboard Endeavour was the seven-windowed Cupola, a control room for robotics that features six windows around its sides and another in the center. It provides a panoramic view of Earth, celestial objects and visiting spacecraft. The mission featured three spacewalks. Endeavour landed at Kennedy on Feb. 21, completing a two-week, 5.7-million-mile journey.



February 2010 Year in Review

Gene Goldman named Marshall deputy director

Arthur E. "Gene" Goldman was named deputy director of the Marshall Center in February. Goldman returned to Marshall after serving as director of the Stennis Space Center near Bay St. Louis, Miss. He was deputy director of Stennis from 2006 to 2008. Before arriving at Stennis, he served two years as manager of the Space Shuttle Main Engine Project at Marshall, and five years as deputy manager of that project. Goldman began his NASA career in 1990.

March 2010 Year in Review

Marshall Center celebrates its heritage with 50 years of engineering, science and technology

1960 was a year of beginnings for the Marshall Center. Five decades later, in 2010, Marshall celebrated its 50th anniversary by highlighting its historical engineering and technology achievements and service to the nation and America's space program. On March 15, 1960, President Dwight Eisenhower issued an executive order designating NASA's first field center as the George C. Marshall Space Flight Center. The order transferred 4,670 civil service employees to NASA from the Army Ballistic Missile Agency's Development Operations Division and 1,840 acres of Redstone Arsenal property and facilities valued at $100 million. The center was named in honor of Gen. Marshall, the Army chief of staff during World War II, who also served as U.S. secretary of state. Marshall was a Nobel Prize winner for his world-renowned Marshall Plan – a U.S. program to rebuild a stronger economic foundation for the countries of Western Europe following the war.

NASA's Payload Operations Center at Marshall marks 9th anniversary

March 8 marked the ninth anniversary of round-the-clock operations at Marshall's Payload Operations Center, supporting scientific research aboard the International Space Station. The Payload Operations Center team has been helping crew members on the station and researchers on the ground accomplish their science goals since 2001. They continued their tradition of wearing Hawaiian shirts to build team spirit among the flight controllers on Fridays throughout the year.

First U.S. sample cartridge opening

The first American research sample processed in the International Space Station's Materials Science Laboratory was opened for study March 16 at the Marshall Center. The Materials Science Laboratory, a furnace facility housed in the new Materials Science Research Rack, was developed and is operated by the European Space Agency aboard the International Space Station. The research rack was developed and built at the Marshall Center. The first sample cartridge returned to Earth contains an aluminum silicon alloy that was melted and resolidified on orbit. Scientists will compare the sample to an Earth-based recreation of the experiment.

March 2010 Year in Review

NASA unveils new manufacturing tank dome technology

In March, the Marshall Center and Langley Research Center in Hampton, Va., partnered with Lockheed Martin Space Systems in Denver, Colo., and MT Aerospace in Augsburg, Germany, to push the envelope in dome manufacturing by using existing commercial materials and cutting-edge technology to create a one-of-a-kind tank dome. An 18-foot dome was developed using two novel manufacturing processes and aluminum lithium 2195, which incorporates a lighter weight material, significantly reducing the number of pieces needed to create a tank dome, eliminates numerous complex welding, machining and inspection steps and can be used on any large liquid propellant tank with greater reliability and lower costs. The process employs friction stir welding, a solid state joining process; spin forming, a metal working process used to form symmetric parts; and 2195 aluminum lithium, a higher-strength, lower-density alloy. The process could be used in the design of launch vehicles, crew vehicles, habitat modules, and other space hardware.

'NASA Marshall' Facebook page tops 5,000 friends

In March, the "NASA Marshall" Facebook presence added its 5,000th friend – reaching the maximum set by the online social network just 11 months after the page was created. Marshall immediately launched a companion page, "NASA's Marshall Space Flight Center" fan page, which at the close of 2010 had added more than 5,000 fans. The friend page at http://www.facebook.com/nasa.marshall continues to spotlight Marshall news and local and internal events for the work force and friends and family across the Tennessee Valley, while the fan page brings Marshall, NASA and related space news to the wider global audience. Become a fan at http://www.facebook.com/nasamarshallcenter.

April 2010 Year in Review

Discovery delivers science racks managed by Marshall

Space shuttle Discovery launched April 5 from the Kennedy Space Center to deliver science experiments, equipment and supplies to the International Space Station, including a multipurpose logistics module filled with science racks managed by the Marshall Center. Known as the Window Observational Research Facility, or WORF, the rack provides a facility for Earth science remote-sensing instruments using the Destiny science window. WORF, which is about the size of a refrigerator, includes the highest quality optics ever flown on a human-occupied spacecraft. Landing was April 20 at Kennedy.

17th annual NASA Great Moonbuggy Race breaks records

At the 17th annual NASA Great Moonbuggy Race April 9-10, nearly half the record-setting 70 teams were race newcomers, and nearly a third of all teams were from countries around the world. The International Space Education Institute in Leipzig, Germany, and the University of Puerto Rico in Humacao won the high school and college divisions, respectively. Marshall kept race fans up to speed via some 350 Tweets each day of the event, including up-to-the-minute Twitter coverage of the awards ceremony, and – for the first time – streaming coverage via the online video service UStream. More than 32,000 people around the world tuned in to watch live, and race footage has been viewed more than 18,000 times at http://www.ustream.tv/channel/the-great-moonbuggy-race-2010.

April 2010 Year in Review

Young rocketeers fly high with NASA Student Launch Projects

Capping the 2009-10 NASA Student Launch Projects, more than 300 students from middle schools, high schools, colleges and universities in 18 states vied April 17-18 to see whose rocket could come closest to the 1-mile altitude goal and safely return its science payload to Earth. Thirty-one rockets flew, cheered on by some 500 North Alabama flight enthusiasts – and by an estimated 30,000 more watching live coverage on UStream from as far away as Brazil, Japan and New Zealand. The rocketry challenge, now in its 10th season, is organized each year by the Marshall Center. The university competition is sponsored by ATK Aerospace Systems in Magna, Utah, which this year awarded the $5,000 first-place prize to the team from the University of Alabama in Huntsville.

May 2010 Year in Review

NASA successfully tests Orion launch abort system

NASA's Pad Abort 1 flight test, a launch of the abort system designed for the Orion crew vehicle, lifted off May 6 at the U.S. Army's White Sands Missile Range near Las Cruces, N.M. The flight lasted about 135 seconds from launch until the crew module touched down about a mile north of the launch pad. The flight was the first fully integrated test of this launch abort system design. The information gathered from the test will help refine design and analysis for future launch abort systems, resulting in safer and more reliable crew escape capability during rocket launch emergencies. The Marshall Center, in partnership with lead center Langley Research Center, provided propulsion oversight during the development of the three motors, which include an abort motor that pulls the Orion capsule from danger, an attitude control motor to provide directional control and the jettison motor that separates the system from the crew module. Marshall also has supporting roles in thermal analysis, structures, mechanisms, avionics, systems engineering, flight test and ground operations.

Shuttle Atlantis lifts off on STS-132 – its last scheduled mission

Space shuttle Atlantis thundered away from the Kennedy Space Center on May 14, taking a six-person crew on a journey to deliver a new Russian module and several critical spare parts to the International Space Station. Flying on the mission was some special cargo – beads designed for Beads of Courage, an organization in Tucson, Ariz., that provides innovative supportive care programs for seriously ill children and their families and the health care providers who care for them. When the STS-132 astronauts visited Marshall in July, they presented 17 "space beads" to Jamie Newton, an employee of CIBER Inc., a support contractor at Marshall, and father of 6-year-old daughter Sydney. Sydney has been battling cancer for more than a year. Newton, in turn, gave them to the Beads of Courage organization and they were given to children undergoing cancer treatment. Atlantis touched down at Kennedy on May 26, returning to its home port for what was planned to be the last time. During its 25 years of spaceflight, Atlantis completed 32 missions and traveled more than 120 million miles.

May 2010 Year in Review

Marshall successfully tests sub-scale rocket motor

Fire and sparks flew as a 24-inch-diameter solid rocket motor was successfully tested May 27 at the Marshall Center. The 21-second firing tested a NASA sub-scale motor designed as a versatile, quick-turnaround and low-cost way to determine the performance of new materials and designs. The test motor's nozzle was replaced with a new design scaled from the Ares I first-stage development motor, but could also be modified to accommodate different mission profiles or different sized vehicles, including heavy-lift vehicles.

June 2010 Year in Review

Marshall recognizes its own with 2010 Honor Awards

More than 250 Marshall Center teams and team members were honored June 3 for their contributions to the work of the center and to NASA's multifaceted mission of exploration and discovery. Among those honored were Todd A. May, special assistant to the Marshall Center director, and Ann R. McNair, director of the Office of Center Operations, both of whom received Presidential Rank of Meritorious Executive awards. Dennis E. Botts of COLSA Corp. of Huntsville, a technical lead engineer supporting the Engineering Directorate's Ground Systems Operations Branch, was honored with NASA's Distinguished Public Service Medal for his leadership in support of the 2009 installation and activation of the Kibo Japanese Experiment Module, the single largest module on the International Space Station. For a complete listing of award recipients, visit http://marshallstar.msfc.nasa.gov/5-27-10.pdf.

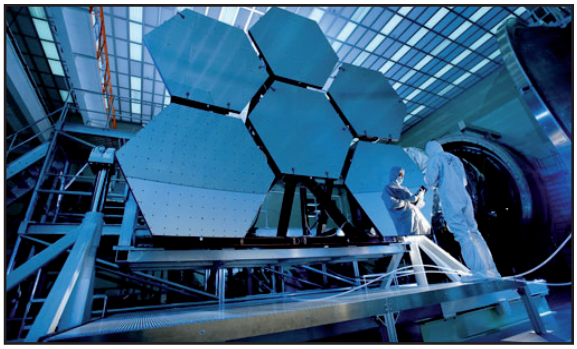
July 2010 Year in Review

NASA honors external tank workforce

As many as 1,000 current and former NASA and Lockheed Martin Space Systems employees who had a part in the 37 years of work on the space shuttle external tank gathered at NASA's Michoud Assembly Facility in New Orleans on July 8 to celebrate the delivery of the last production tank, ET-138. Other tanks were delivered by Lockheed to NASA in February, May and September.

James Webb Space Telescope continues cryogenic mirror test

Cryogenic mirror testing continued to progress in July on the James Webb Space Telescope mirror segments at the X-ray & Cryogenic Facility at the Marshall Center. During testing, the mirrors are subjected to extreme temperatures dipping to -415 degrees Fahrenheit, permitting NASA contractor engineers to measure in extreme detail how the shape of the mirror changes as it cools. The Webb telescope has a total of 18 mirrors. Each of the 18 mirror segments will be cryogenically tested twice in Marshall's X-ray & Cryogenic Facility to ensure that the mirror will maintain its shape in a space environment – once with bare polished beryllium and again after a thin coating of gold is applied.



July 2010 Year in Review

Shuttle propulsion hardware deliveries are completed

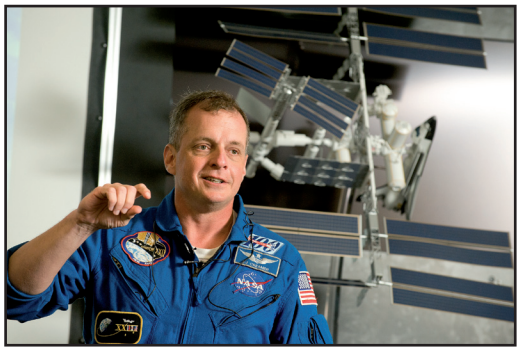
Steve Cash, manager of the Shuttle Propulsion Office at the Marshall Center, congratulated shuttle team members at an annual awards ceremony July 14 for the completion of hardware deliveries to meet the space shuttle manifest. Deliveries of all space shuttle main engines, external tanks and reusable solid rocket motors and boosters were completed. "All hardware for the remaining shuttle flights is at the Kennedy Space Center," Cash added. "You have done your job and I'm extremely proud of you."

Taking a shot at the sun

On July 30, for a thrilling eight minutes, NASA researchers watched as a Black Brant sounding rocket made its way to take a peek at one of the sun's most mysterious regions, where temperatures fluctuate from tens of thousands of degrees Fahrenheit to several million, and solar flares and coronal mass ejections originate – potentially threatening spacecraft, Earth-based communications and the lives of explorers in space. To learn more about this turbulent region of the sun, known as the transition region, Marshall solar physicists and engineers have designed the Solar Ultraviolet Magnetograph Investigation, or SUMI, to determine the strength and direction of magnetic fields in a region of the sun where the magnetic field has never been measured.

August 2010 Year in Review

Space station astronaut shares mission with Marshall



International Space Station astronaut T.J. Creamer shared highlights of his Expedition 22/23 missions during a visit to the Marshall Center on Aug. 25. Creamer thanked the Payload Operations Center team for its support in planning and executing science during his 161 days living and working in space – from Dec. 20, 2009, to June 1, 2010. He and his crew members supported three space shuttle missions that delivered the U.S. Tranquility module, put the finishing touches on U.S. laboratory research facilities and attached the Russian Rassvet laboratory to the station.

NASA, ATK test five-segment solid rocket motor

With a loud roar and mighty column of flame, NASA and ATK Space Systems successfully completed a two-minute, full-scale test Aug. 31 of the largest and most powerful solid rocket motor designed for flight. The stationary firing of the first-stage development solid rocket motor dubbed DM-2 – short for Development Motor-2 – was conducted by ATK at its Promontory, Utah, test site. Prior to the static test, the solid rocket motor was cooled to 40 degrees Fahrenheit to verify the performance of new materials and to assess motor performance at low temperatures during the full-duration test. The solid rocket motor was built as an element of NASA's Constellation Program and is managed by the Ares Projects Office at Marshall.

August
2010
Year in Review

NASA gets a GRIP on hurricanes

Earth scientists and engineers at the Marshall Center participated in a six-week multi-agency hurricane study this summer called the Genesis and Rapid Intensification Processes, or GRIP, to study some of the world's fiercest storms. The goals of the campaign were to answer some of the most fundamental – yet still unanswered – questions of hurricane science: What ultimately causes hurricanes to form? Why do some tropical depressions become strong hurricanes, while others dissipate? What causes the rapid strengthening often seen in hurricanes? The study involved three storm chaser planes mounted with 15 instruments. Two Marshall instruments flew in the campaign: the Lightning Instrument Package, or LIP, a flight instrument designed to track and document lightning as hurricanes develop and intensify; and the Hurricane Imaging Radiometer, known as HIRAD, an instrument that will help determine the strength and structure of hurricanes by looking at wind speeds deep within the storm.

September
2010
Year in Review

50 years of history, 50 years of achievement

The Marshall Center hosted a pair of 50th anniversary events Sept. 8 – exactly 50 years after the center was dedicated in 1960 by President Dwight Eisenhower – to honor five decades of science, engineering and spaceflight achievements. Center Director Robert Lightfoot was joined by NASA leaders and Huntsville, Madison, Madison County and Alabama officials and their representatives to unveil an Alabama historic marker commemorating the center's formation. The marker was erected outside the Redstone Arsenal Visitors Center at Gate 9. Team members also assembled that day for a team portrait and anniversary event honoring "The Work of Generations." Also marking the date were the cities of Huntsville and Madison and the Madison County Commission, which jointly proclaimed Sept. 8, 2010, to be "Marshall Space Flight Center Day."

NASA takes international approach to observing the moon

On Sept.18, the Marshall Center and NASA's Lunar Quest Program participated in the first "International Observe the Moon Night" allowing visitors the opportunity to learn more about the moon. The lunar science and education community, amateur astronomers and space enthusiasts shared their excitement of lunar science and space exploration. The well-attended event featured several hands-on activities for children and adults, including an inflatable planetarium. Several large amateur telescopes were set up on the lawn and staffed by astronomers to allow visitors to view the moon's features and ask questions about its surface.


Marshall Star

Vol. 5; No. 4 NASA George C. Marshall Space Flight Center — Huntsville, Alabama September 30, 2010

Marshall Star turns 50!

By Jessica Wallace Eagan

Just 20 days after the dedication of the Marshall Space Flight Center by President Dwight Eisenhower, the Marshall Star went to press for the first time – Sept. 28, 1960.

About 2,500 issues later, the Star is celebrating its 50th anniversary of delivering relevant and timely news to the Marshall Center community.

Created by a group of civil service employees – many former newspaper reporters – the Star was published by the center's Public Information Office under the editorship of Don Lakey for many years. Since then, about a dozen people have held the title of editor.

Marshall historian Mike Wright served as editor from 1986 to 1987. "I came to Marshall in May 1986, and for the next 18 months, the Star was continually on my mind," recalled Wright. "This newspaper has always been very important to Marshall management and team members.

"There were times that I'd get up in the middle of the night to proof pages again after already reviewing them because it was critical that all the content was accurate," he added. "It was very typical of

See Star on page 4

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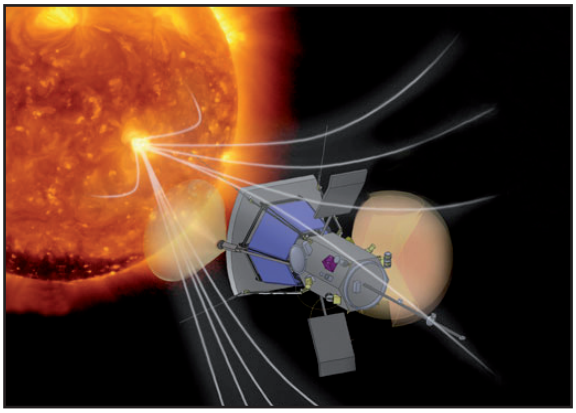
September 2010 Year in Review

Marshall scientist finds place in sun with solar probe instrument win

In September, Dr. Jonathan Cirtain, an astrophysicist at the Marshall Center, and his science team secured a proposal award of $8.2 million to help build parts for and test an instrument for the Solar Probe Plus flagship mission to directly sample the sun's atmosphere. Solar Probe Plus promises to transform our understanding of the sun and its effects on the solar system. It will explore a region no other spacecraft has ever encountered. The unprecedented mission is slated to launch no later than 2018.



Lightfoot *Continued from page 2*

Because of those changes, we lost many of our colleagues. Their work will remain a significant contribution as we go forward. I deeply appreciate the work they did for us and for space exploration.

While it seems likely we will remain under a continuing resolution for funding in early 2011, it's a positive sign that bipartisan congressional support provided NASA a $19 billion authorization for the new year and several new efforts that Marshall expects to be involved in.

Foremost among those is a new heavy lift rocket to replace the Space Shuttle and provide an important national asset capable of supporting exploration beyond Earth orbit and other missions of national and economic importance.

Throughout 2010, our engineers were involved in every detail of planning for this new capability and providing decision makers with the information they need to set a course. By last November, NASA was ready to solicit industry inputs and selected 13 for contract negotiations for systems analysis and trade studies. We've also been working on acquisition strategies and organizational models and a path to a systems requirement review.

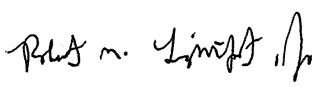
The Authorization also extends the Space Station to at least 2020, good news for science payload management and the Payload Operations Center at Marshall, which will mark 10 years of continuous operation this spring. We manage a lot of systems on ISS, including life support. That's good work for our team, and we're excited about that.

The Authorization includes line items for technology development and demonstrations, including robotic precursors, cryogenic fluid management, propellant depots, etc. where the agency has outlined roles for Marshall, based on our experience with propulsion, robotics, and technology development.

I also must emphasize that we can't talk about the future without taking care of the present. We need to be able to execute textbook missions on the shuttle and on the station if we expect to conduct long-duration missions beyond Earth orbit.

When we get an appropriation, we will be ready to move ahead quickly. There will be more changes ahead, but they will come with new missions to challenge us and inspire the world, all drawing on all Marshall's historic strengths.

Because of your hard work, I'm certain you've positioned us for a successful 2011 and a bright future in space exploration. Thanks for all you do for NASA and this nation.



Robert Lightfoot
Marshall Center Director

October 2010 Year in Review

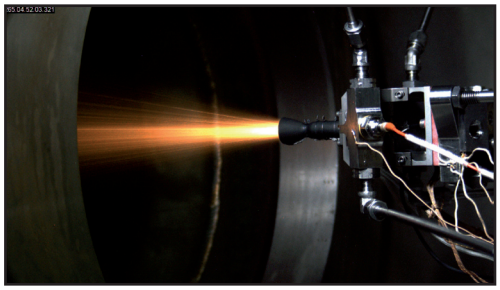
SERVIR node opens in the Himalayas

NASA and the U.S. Agency for International Development have expanded their successful collaboration with international partners to launch an innovative, Web-based environmental management system for the Himalayan region. The partners inaugurated this state-of-the-art regional monitoring system, known as SERVIR-Himalaya, at the International Centre for Integrated Mountain Development in Kathmandu, Nepal, on Oct. 5. SERVIR was developed by researchers at the Marshall Center. SERVIR features Web-based access to satellite imagery, decision-support tools and interactive visualization capabilities, and puts previously inaccessible information into the hands of scientists, environmental managers, and decision-makers. The Earth observation information is used to address threats related to climate change, biodiversity and extreme events such as flooding, forest fires and storms.

Marshall, NASA lend hand to free Chilean miners

NASA and the Marshall Center had a hand in the successful Oct. 13-14 rescue of 33 Chilean mine workers trapped underground for 10 weeks. Robert Garcia, NASA's Propulsion Technical Fellow at Marshall, is part of the NASA Engineering Safety Center team which helped Chilean rescuers finalize the design of the container used to lift the miners to freedom. The Engineering Safety Center is an agency-wide task force that provides real-time response to government, industry and private organizations worldwide.

NASA thruster test aids future robotic lander's ability to land safely



The Marshall Center collaborated with the White Sands Test Facility and Pratt & Whitney Rocketdyne in Canoga Park, Calif., to successfully complete a series of thruster tests at the test facility Oct. 17. The test will aid in maneuvering and landing the next generation of robotic lunar landers that could be used to explore the moon's surface and other airless celestial bodies. The Robotic Lunar Lander Development Project at Marshall performed a series of hot-fire tests on two, high thrust-to-weight thrusters – a 100-pound class for lunar descent and a 5-pound class for attitude control. The team used a lunar mission profile during the test of the miniaturized thrusters to assess the capability of these thruster technologies for possible use on future NASA spacecraft. The test results will allow the Robotic Lander Project to move forward with robotic lander designs using advanced propulsion technology.

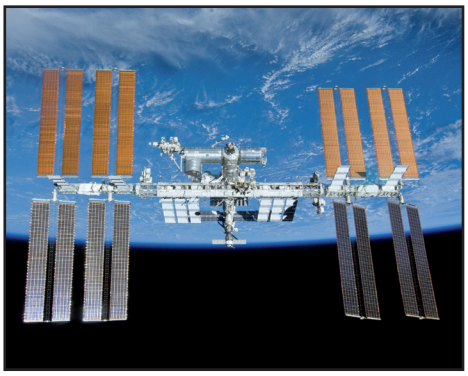
Marshall co-hosts Wernher von Braun Memorial Symposium on Oct. 25-27

The Marshall Center co-hosted the third annual Wernher von Braun Memorial Symposium on Oct. 25-27 in Huntsville. With the theme "21st Century Approaches to the Use and Development of Space," the conference brought together space professionals from government, industry, academia, business and international partners.

November 2010 Year in Review

International Space Station marks 10th anniversary

The International Space Station partner agencies marked a major milestone Nov. 2 with the 10-year anniversary of people living permanently aboard the space station. More than 600 different research and technology development experiments have been conducted on the station, many of which are producing advances in medicine, recycling systems and a fundamental understanding of the universe. NASA has updated the content of the International Space Station section of its website in recognition of the 10th anniversary. The website now focuses on the research in the unique microgravity environment of low-Earth orbit.



NASA's newest microsatellite FASTSAT launches successfully

NASA's Fast, Affordable, Science and Technology Satellite, or FASTSAT, launched Nov. 19 aboard a Minotaur IV rocket from Kodiak Launch Complex on Kodiak Island, Alaska. FASTSAT is a unique platform that can carry multiple small payloads to low-Earth orbit creating opportunities for researchers to conduct low-cost scientific and technology research on an autonomous satellite in space. The satellite carried six small payloads, including the Marshall-managed NanoSail-D, a nanosatellite designed to demonstrate the deployment of a compact solar sail boom system that could lead to further development of alternate propulsion technology.

December 2010 Year in Review

Marshall raises $726,656 for '10 Combined Federal Campaign

Marshall exceeded its 2010 fundraising goal for the Combined Federal Campaign, raising a total of $726,656 during the goodwill drive, which ran from Sept. 30 to Dec. 10. Marshall Center Director Robert Lightfoot had challenged team members to raise $675,000 for local, regional and national charitable organizations. Marshall's effort is part of the Tennessee Valley campaign, a joint effort between Marshall, the Army's Aviation and Missile Command and other federal agencies at Redstone Arsenal and in surrounding Alabama and Tennessee counties.

Marshall's Twitter followers continue to swell

Twitter, the 140-character shortform Web communication tool, continues to prove an unstoppable social media force for the Marshall Center. More than 4,800 new users joined Marshall's Twitter feed in 2010, bringing the total to more than 6,700 followers, who rely on Twitter for daily updates on Marshall news, milestones and events. To join, visit http://twitter.com/NASA_Marshall and click "follow."

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